II.E.6. Thus, there is nothing that would have prevented the applicant from including the Plan in the DEIR. 5-86 cont'd

Second, all of the six measures that would be included in the Plan are already required by SCAQMD Rule 403. The DEIR claims that Rule 403 only requires watering twice per day and that increasing this to three times per day would reduce PM10 emissions by an additional 18%. (DEIR, p. 4-18.) However, Rule 403 requires the project to "utilize one or more of the applicable best available control measures to minimize fugitive dust emissions from each fugitive dust source type which is part of the active operation." (Rule 403(d)(2).) The listed best available control measures in Mitigation Measure A-8 are responsive to this requirement. 5-87

The DEIR argues that Rule 403 only requires construction sites to be watered two times per day. (DEIR, p. 4-18.) However, this is not correct. Rule 403 requires that at least one best available control measure be selected from the Rule 403 Implementation Handbook for each site activity. (Rule 403(a)(3).) For land clearing and earth moving, the Handbook requires "pre-application of water to depths of proposed cuts" prior to grading and in active earth moving areas, "water should be applied at sufficient frequency and quantity to prevent visible emissions from extending more than 100 feet from the point of origin." For inactive disturbed areas, the Handbook "requires frequent applications unless a surface crush can be developed." (Handbook, pp. 6-2, 6-6.) Thus, claiming an additional 18% reduction for watering three times per day is not warranted as mitigation since it is required by Rule 403. 5-88

II.E All Feasible Mitigation Is Required

The DEIR concludes that construction emissions for CO, VOCs, and NOx would remain significant following mitigation (DEIR, p. 4-20), after evaluating the measures listed in the SCAQMD's CEQA Guidelines. (DEIR, p. 4-17/18.) In addition, the PM10 emissions would remain significant following mitigation when the errors and omissions in the DEIR's PM10 emissions are corrected. (Comment I.) 5-89

However, nothing in CEQA limits an applicant to only the measures listed in the Lead Agency's CEQA Guidelines. In fact, the SCAQMD Guidelines observe [referring to measures listed in the Guidelines]: "These lists are not exhaustive. Both lead agencies and project proponents are encouraged to identify and quantify additional mitigation measures appropriate to individual project." (SCAQMD 3/93, p. 11-2.) The DEIR did not look beyond the SCAQMD's CEQA Guidelines for suitable mitigation measures. As discussed below, many are available, which in combination are capable of reducing the project's impacts to a less than significant level. 5-90

As discussed above, the mitigation program proposed in the DEIR is inadequate. CEQA requires implementation of all feasible mitigation measures. Thus, the DEIR must be expanded to include all feasible mitigation and recirculated for public review. The following subsections describe some feasible mitigation measures that have been widely used to mitigate construction impacts and should be adopted for this project.

5-90 cont'd

II.E.1 PuriNOx

The DEIR recommends the use of "alternate fuels" for on-site mobile equipment "to the extent feasible." (DEIR, p. 4-18.) However, the DEIR does not specify which, if any, fuel might actually be used, nor set any specific mitigation goals.

PuriNOx™ was verified by CARB on January 31, 2001[13] and is the only alternative fuel formulation that has been evaluated by CARB. This fuel has been verified by CARB as achieving a 14% reduction in NO_x and a 63% reduction in PM_{10}.

A recent study evaluated the performance of PuriNOx based on the entire PuriNOx emission database. The study concluded that PuriNOx reduced NOx by 19% and PM10 by 54%. PM10 reductions increased to 60% when the Caterpillar 3306 engine was excluded. This engine was an outlier in terms of PM10 and CO emissions. Hydrocarbon emissions were slightly increased relative to NOx reductions, but there was an overall reduction in ozone precursor emissions of 16%. CO emissions were also reduced 17% when the Caterpillar 3306 engine was omitted, but increased 18% when this engine was included.[14] Any increase in CO or VOC emissions can be offset by using oxidation catalysts, as discussed below in Comment II.E.4.

5-91

PuriNOx can be used in any direct-injection heavy-duty compression ignition engine and is compatible with existing engines and existing storage, distribution, and vehicle fueling facilities. Operational experience indicates little or no difference in performance and startup time, no discernable operational differences, no increased engine noise, and significantly reduced visible smoke.[15]

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[13] Letter from Dean C. Simeroth, Chief, Criteria Pollutants Branch, to Thomas J. Sheahan, Lubrizol, January 31, 2001. altdsl/altdsl.htm.

[14] Air Improvement Resource, Inc., Comparative Analysis of Vehicle Emissions Using PuriNOx™ Fuel and Diesel Fuels, Prepared for The Lubrizol Corporation, April 4, 2001.

[15] Personal communication, Phyllis Fox with Hep Hepner, Ramos Oil Co. (916-371-3289, ext. 242) and Bill Hagstrand, Lubrizol (440-347-6592), March 19-21, 2001.

This fuel has been successfully used in heavy-duty off-road and on-road equipment, including by the County of Sacramento at the Keifer Landfill and North Transfer station, in off-road construction equipment at very large residential construction projects in Sacramento, in truck fleets operated by Pacific Cement in San Francisco and Ramos Oil in Dixon, in yard hustlers at the Port of Long Beach, and in off-road equipment operated by Hanson Aggregate in San Francisco.

PuriNOx was jointly developed by Caterpillar and Lubrizol, a large Canadian chemical company. As distributed in California, PuriNOx is a blend of diesel and 20% water plus a special additive package. The fuel can be either manufactured on site (depending on fuel usage volume) in a leased blending unit or purchased from a local distributor and stored in on-site portable tankage or wet-hosed into construction equipment. Lubrizol indicates that PuriNOx should be available locally in the South Coast by September 1 at up to 10 to 15 cents per gallon more than regular diesel,[16] plus any appropriate taxes, subject to purchase quantity, delivery distance and delivery options such as "wet-hosing." 5-92

The DEIR should be modified to require the use of PuriNOx™ or other equivalent alternative diesel fuel verified by CARB to reduce PM_{10} emissions by at least 63% and NOx emissions by at least 14% in all off-road construction equipment and on-road truck fleets that make deliveries to the project. Any exempted equipment shall be documented, verified, stamped, and signed by a registered California professional engineer. The project owner shall submit records of purchase of the alternative diesel fuel as part of monthly construction reports to the SCAQMD. A list of any exempted equipment with a valid exemption certificate signed by a registered California professional engineer shall be submitted to the SCAQMD for approval.

II.E.2 Fuel Additives

Fuel additives can also be used to improve combustion efficiency and thereby reduce emissions. Two cetane improvers[17] (ethyl hexyl nitrate, di-tertiary butyl peroxide) and soy methyl esters were found to reduce HCs by 20% to 39% 5-93

[16] Personal communication, Phyllis Fox with Bill Hagstrand, Lubrizol, July 18, 2001. Maximum increase, based on lowest likely rack price for the base diesel.

[17] The cetane number is a measure of the ignition quality of diesel fuel and is the percentage of cetane ($C_{16}H_{34}$) in a mixture of cetane and alpha-methyl naphthalene. When this mixture has the same ignition characteristic in a test engine as the diesel fuel, the diesel fuel has a cetane number equal to the percentage of cetane in the mixture. Regular diesel is 40-50 cetane and premium is 45-50.

(EHN increased HCs), CO by 12% to 19%, total PM by 5% to 19%, and NOx by 4% to 7%.[18]

Omstar D-1280X, a blend of esters, is one of the most widely used, commercially available additives. This additive was originally developed as an engine lubricant and has been widely used in the western U.S. and Japan by many fleet maintenance managers to reduce emissions, fuel use, and maintenance for a wide range of diesel-powered equipment.

5-93 cont'd

CARB tested the additive in eight GM heavy-duty diesel trucks operated on two separate fuels under a range of driving conditions. They concluded that Omstar resulted in a statistically significant reduction in HC of 43% and in CO of 8%. Particulate results were mixed, increasing by 0.04 g/mi for one fuel and decreasing by 0.02 g/mi for the other, but the results were not statistically significant at the 95% level.[19] In a four-year study in Los Angeles from 6/88 to 8/92, Omstar was found to reduce exhaust smoke opacity by 89% in 11 heavy-smoker buses and 76% in the total sample buses servicing LAX.[20]

Omstar has been used in a number of off-road, on-road, and marine applications. It is used in all construction equipment rented by B&G Industrial Rental, the California distributor of the product. They report that it costs about 4 cents per gallon of fuel treated and reduces fuel use, increases power, reduces maintenance requirements, and reduces exhaust opacity. The Metropolitan Stevedore Company, a very large cargo handling firm located at the Port of Los Angeles uses it in sideloaders, yard hostlers, toploaders, forklifts, and rotators. Many truck fleets use Omstar, including cement powder trucks operated by CEMAK Trucking in Bellflower, CA; refuse trucks operated by Great Western Reclamation; fire trucks operated by the Chandler, AZ, Fire Department; and long-haul trucks operated by Wells Cargo in Las Vegas, NV, among others. It has also been used in numerous bus fleets including those operated by the Torrance School District, the Desert Sands Unified School District serving Indio and Palm Springs, the Anaheim Union High School District, Pacific Coast Sightseeing, Mark IV Charter Lines, Antelope Valley Bus Company, City of

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[18] Michael E. Starr, Influence on Transient Emissions at Various Injection Timings, Using Cetane Improvers, Bio-Diesel, and Low Aromatic Fuels, SAE Technical Paper 972904, Presented at International Fall Fuels & Lubricants Meeting & Exposition, Tulsa, Oklahoma, October 13-16, 1997.

[19] Sierra Research, Inc., A Review of the Air Resources Board's Test Program for the Omstar D-1280X Diesel Fuel Additive, Prepared for CARB, February 14, 1990; Letter from R.B. Summerfield, CARB Mobile Source Division, to All Interested Parties, Re: Evaluation of Omstar Additive D-1280X, Reference No. RS-91-01, April 23, 1991.

[20] California Environmental Engineering, Santa Ana, City of Los Angeles, Department of Airports Test Results Summary. 4 Year Study of the Effects of "Omstar Diesel Fuel Conditioner D-1280X" on Shuttle Bus Exhaust Smoke Opacity, 1993.

Napa, and Miami Valley Rapid Transit Agency in Dayton, Ohio, among others. These users report significant reductions in smoke opacity ranging from 37% to 87%. It has also been used in fishing boats and ocean liners to reduce smoke.[21]

5-94 cont'd

II.E.3 CARB-Certified Construction Equipment

Exhaust emissions of all criteria pollutants could be reduced by requiring the use of at least 20% CARB-certified off-road engines in the mix of construction equipment operating on-site. This measure has been required by the Sacramento Metropolitan Air Quality Management District ("SMAQMD") to mitigate construction emissions.[22]

5-95

CARB-certified off-road engines are engines that are 3 years old or less at the time of use. Large construction companies and equipment rental firms rotate their equipment every 2 to 3 years, selling their used equipment to smaller firms. The SMAQMD surveyed construction firms in the Sacramento area and concluded that as of model year 2000, greater than 25% of Sacramento's mobile off-road inventory contained CARB-certified engines.[23] In December 1999, the Sacramento County Transportation Division surveyed ten contractors who provide paving and general construction services in the Sacramento area. This survey concluded that 32% of the equipment in fleets operated by eight out of ten contractors contain CARB-certified engines.[24] The results for two of the largest construction companies, which also work statewide, including in the South Coast, are as follows:

5-96

		Ford	Teichert
175 – 759 hp	Fleet Total	62%	89%
	Pre-1996 engines	19%	51%
	1996 or newer engines	44%	38%
100 – 174 hp	Fleet Total	16%	4%
	Pre-1997 engines	9%	2%
	1997 or newer engines	7%	2%
50 – 99 hp	Fleet Total	21%	7%
	Pre-1998 engines	15%	3%
	1998 or newer engines	6%	4%

[21] Personal Communication, Bonnie Hudson, B&G Industrial Rentals, Inc., Gardena, CA, 310-327-0804, July 30, 1998.

[22] Personal Communications, Peter Christensen, SMAQMD, March 2001.

[23] Personal Communications, Peter Christensen and Ron Mertz, SMAQMD, March 1 - 5, 2001.

[24] Sacramento County, Transportation Division, Construction Equipment Survey, December 1999. Contact: Mike Penrose, Design Services Manager.

About 30% of the equipment in the Ford fleet used CARB-certified engines. Ford indicates that their fleet is currently about 50% compliant and that nearly 100% of the equipment required to construct this project would be CARB-certified.[25] About 34% of the equipment in the Teichert fleet used CARB-certified engines in 1999. The Teichert fleet is currently 35% compliant.[26] Teichert has recently complied with this requirement on three large projects in the East Franklin Planning Area and stated that it could comply even if 100% of their clients requested new equipment. Teichert has also agreed to use PuriNOx in its fleet when required and is currently working out the arrangements with Lubrizol.

Both Ford and Teichert stated that there would be no surcharges or fees for the use of new equipment because enough CARB-certified equipment is currently in the inventory to supply demand. Further, this equipment is more efficient and reliable than older equipment. Newer equipment achieves better fuel economy, requires less maintenance, and experiences fewer breakdowns than older equipment. The construction contractor takes care of any required record keeping and reporting requirements.

5-96 cont'd

The County survey also indicated that 26% of eight companies' fleets are rented. The District surveyed five rental firms, S.M.A. Rentals, United, HOLT Tenco, U.S. Rentals, and Hertz. This survey concluded:

> "Larger rental operations in the Sacramento area generally rent equipment that is new or nearly new. One operation uses exclusively new or nearly new equipment with regulated engines. Others have some types of equipment (e.g., compactors, large earth movers) that are older (unregulated) mixed with newer, cleaner models. On balance, the required use of offroad equipment with regulated engines should be achievable by renting, with competition ensured between existing rental companies in the Sacramento area."[27]

I also surveyed several large construction equipment rental firms that service the Los Angeles area. These firms stated that 80% to nearly 100% of their fleet currently use CARB-certified engines. Tenco stated that they depreciate

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[25] Personal Communication, Mike Hobbs, Estimator, Ford Construction (209-333-1116), March 5, 2001.

[26] Personal communication, Becky Wood, Environmental Compliance (916-386-6964), Teichert, March 5, 2001.

[27] SMAQMD, Ratios of Regulated (6.9 g/bhp-hr NOx) Diesel-Engine Offroad Construction Equipment to Unregulated Engines in Sacramento-Area Rental Fleets, January 2000.

rental equipment over 3 years and sell the equipment as used at the end of 3 years, consistent with the District survey.[28]

Therefore, the DEIR should be modified to require that a 20% CARB-certified engine mix be used to construct the project. This could be implemented by including a specification in the bid package. Most large firms could easily comply with no increase in cost. To confirm compliance, the project owner shall submit an affidavit signed by the project owners and stamped and sealed by a registered California professional engineer to the SCAQMD for approval. 5-96 cont'd

II.E.4 Post-Combustion Controls

Post-combustion controls are control devices that are installed downstream of the engine on the tailpipe to treat the exhaust. The DEIR recommended that the applicant evaluate the feasibility of retrofitting large off-road construction equipment that will be operating for significant periods, but did not identify all of the potential candidate technologies or commit the applicant to using any of them. (DEIR, p. 4-18.) These types of controls have been widely used as CEQA mitigation and should have been required without the need to evaluate them. 5-97

The most common and widely used post-combustion control devices are particulate traps (i.e., soot filters), oxidation catalysts, and combinations thereof. The many variants of these devices have recently been identified, evaluated, and comprehensively reviewed by CARB[29] and others.[30] These devices have been widely used on construction and on-road equipment and are capable of removing over 90% of the PM10, CO, and VOCs from engine exhaust, depending on the fuel and specific engine.

While the feasibility of these controls is not in question, it is necessary to evaluate each individual piece of equipment after a contractor is selected. The applicability of particulate traps depends on the duty cycle and type of engine, which must be individually evaluated for any given fleet. Generally, particulate traps cannot be used on older, dirtier-burning, 2-stroke engines because their operating temperatures, 300 to 600°F, are too low to effectively burn off the 5-98

[28] The firms that I contacted are: Tenco Rentals, Hertz Equipment Rental, United Rentals Companies, NationsRent, and Contractor's Warehouse.

[29] California Air Resources Board (CARB), Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles, October 2000; CARB, Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines, October 2000.

[30] Manufacturers of Emission Controls Association, Demonstration of Advanced Emission Control Technologies Enabling Diesel-Powered Heavy-Duty Engines to Achieve Low Emission Levels, Final Report, June 1999.

accumulated soot. Presumably, this will not be an issue here as predominately newer equipment will be used. A procedure that has been successfully used for determining the applicability, for purposes of CEQA mitigation, is presented at the end of this comment.

Starting in 1995, Hug, the Swiss engineering firm, installed particulate traps and oxidation catalysts on loaders, excavators, and mining equipment. See vendor application list in Exhibit 1.

The Northeast States for Coordinated Air Use Management (NESCAUM), a nonprofit association of air pollution control agencies in the six northeast states plus New York and New Jersey, recently completed an off-road construction equipment retrofit and testing program. Four types of off-road construction equipment were variously retrofit with three different oxidation catalysts, passive particulate traps with and without a platinum catalyst, and an electrically-regenerated active particulate trap. These vehicles were (and continue to be) operated under normal use conditions for coal handling at a power plant. 5-98 cont'd

The equipment included two front end loaders, a 1971 320-hp Cat 988 and a 1994 150-hp Volvo; a 1985 International dozer equipped with a 450-hp Cummins engine; a 1994 84-hp Cat backhoe; and a 1988 International dump truck equipped with a 210-hp Navistar engine.

The performance varied widely, depending on the specific post-combustion control device and the engine. The oxidation catalysts removed 5% to 52% of the CO, 0% to 83% of the hydrocarbons, 0% to 25% of the PM10, and 0% to 20% of the NOx. The passive catalyzed particulate trap removed about 96% of the PM10, 66% of the CO and HC, and 16% of the NOx. The electrically-regenerated uncatalyzed active particulate trap removed 81% of the PM10, 16% of the CO, and 12% of the hydrocarbons.[31]

The Port of Oakland has proposed to substantially expand its facilities and recently adopted and allocated about $9 million for mobile source CEQA mitigation. This mitigation package included particulate trap and catalytic converters to control exhaust emissions from cargo-handling equipment (e.g., cranes, loaders), tug boats, bus fleets, and on-highway container transport trucks.[32] The program is currently being implemented. The Port will fund voluntary engine retrofits with port operators and fleet operators who service the 5-99

[31] B. Ainslie and others, The Impact of Retrofit Exhaust Control Technologies on Emissions from Heavy-Duty Diesel Construction Equipment, SAE Technical Paper Series, Reprint 1999-01-0110, Diesel Exhaust Aftertreatment 1999, March 1-4, 1999.

[32] Port of Oakland, Berths 55-58 Project Final Environmental Impact Report, April 8, 1999.

Port. Marine terminal operators have signed grant agreements with the Port under the Container Terminal Equipment Repower and Retrofit Program.[33] The Port of Houston is also implementing a voluntary program to retrofit 50 to 250 port-side vehicles with oxidation catalysts and/or PuriNOx or SCR.[34]

5-99 cont'd

These controls were required as CEQA mitigation by the San Luis Obispo Air Pollution Control District ("SLOCAPCD") for the Avila Beach remediation project and are now routinely required by SLOAPCD as CEQA mitigation for construction impacts. At Avila, the SLOCAPCD required four pieces of equipment that operated the largest number of hours to be retrofit with oxidizing particulate traps -- three excavators and a D-6 Caterpillar dozer. No contractor complaints or operational problems were experienced.[35] The SCAQMD is aware of this experience and commented on another DEIR that "the Lead Agency should also consider the possibility of requiring particulate traps on construction equipment. Information on this potential control option can be obtained from the AQMD or the San Luis Obispo Air Pollution Control District." (Smith 2/22/00.)

5-100

These types of controls were also required as CEQA mitigation for ARCO's Clean Fuel Project. Up to 30 school buses from the San Diego School District are being retrofit with Continuous Regenerating Technology to remove 90% of the PM10 and the Engelhard DPX oxidizing particulate traps to remove 90% of the PM10, 80% of the hydrocarbons, and 80% of the CO.[36] The City of San Diego also required oxidizing particulate traps on all off-road construction equipment 100 hp or larger except cranes as CEQA mitigation for the Padres Ball Park.

The California Energy Commission requires the use of oxidizing particulate traps on equipment used to construct most of the power plants that it licenses. The Sunrise project was recently constructed using this equipment.[37] No problems were encountered. Several 500+MW power plants are currently under construction that are also successfully using these controls, including High Desert,[38] Elk Hills,[39] Pastoria,[40] Midway-Sunset[41], Three Mountain,[42] and Contra

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[33] Personal communication, Stefan Serum, Port of Oakland, July 18, 2001.

[34] www.epa.gov/OMS/retrofit/exporthouston.htm.

[35] Letter from Larry Allen, SLOCAPCD, to March Pryor, CEC, Re: Sunrise Cogeneration and Power Project Evidentiary Hearings, February 14, 2000.

[36] www.epa.gov/OMS/retrofit/exsandiego.htm.

[37] California Energy Commission, Commission Decision, Sunrise Power Project, December 2000, Condition AQ-C3, p. 120.

[38] California Energy Commission, Commission Decision, High Desert Power Project, May 2000, Condition AQ-3(o), p. 107.

Costa.[43] All of these decisions are posted at www.energy.ca.gov under the name of the individual facility.

Post-combustion controls are also in use at the "Big Dig," the massive, 5-year, $10 billion-plus Central Artery/Tunnel Project in Boston's North End and one of the largest infrastructure construction projects in the county. Seventy pieces of construction equipment, including front end loaders, backhoes, excavators, cranes, and air compressors, representing 25% of all the equipment operated on a longer-term basis, have been retrofit with either oxidation catalysts or particulate filters.[44]

Finally, NOx can be controlled using selective catalytic reduction ("SCR"). This technology has been successfully used in off-road equipment. SCR has been running problem-free since November 1998 on a large Caterpillar 225B excavator at Safety-Kleen in Deer Park, Texas.[45]

Thus, there can be no excuse for not using these controls on equipment that would be used to construct the project. We recommend that the applicant install oxidizing particulate traps on all suitable construction equipment used either on the Refinery site or associated with linear construction sites (e.g., pipelines) or blending terminal projects. Major sources of NOx, such as the loaders, should be retrofit with SCR. Suitability is to be determined by an independent California Licensed Mechanical Engineer who will stamp and submit for approval an initial and subsequent Suitability Reports, as necessary, containing at a minimum:

Initial Suitability Report

- The initial suitability report shall be submitted to the SCAQMD for approval 60 days prior to breaking ground on the project site.

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[39] California Energy Commission, Commission Decision, Elk Hills Power Project, December 2000, Condition AQ-C2(3), p. 123.

[40] California Energy Commission, Commission Decision, Pastoria Energy Facility, December 2000, Condition AQ-C3, p. 108.

[41] California Energy Commission, Commission Decision, Western Midway Sunset Power Project, March 2001, Condition AQ-C2, p. 114.

[42] California Energy Commission, Commission Decision, Three Mountain Power Plant Project, May 2001, Condition AQ-26, p. 142.

[43] California Energy Commission, Commission Decision, Contra Costa Unit 8 Power Project, May 2001, Condition AQC-2, p. 12.

[44] www.epa.gov/OMS/retrofit/documents/bigdig_case_01.htm.

[45] www.dieselnet.com/news/9906del.html.

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